

1                   **DRAWER RAIL WITH AUTO-RETURNING DEVICE**

2    **BACKGROUND OF THE INVENTION**

3    1. Field of the Invention

4           The present invention relates to a drawer rail with an auto-returning  
5    device, and particularly to a drawer rail that moves stably and is automatically  
6    returned to an original place to keep a drawer closed.

7    2. Description of Related Art

8           To keep a drawer closed when not in use, an auto-returning device with a  
9    spring is mounted on a drawer rail to provide an auto-returning restituting  
10   efficiency to the drawer. However, a conventional auto-returning device has  
11   complex elements and has a high production cost which result in a high overall  
12   price for such a drawer. Therefore, consumers do not choose the drawer having  
13   the auto-returning device based on a consideration of the high price.  
14   Additionally, the conventional auto-returning device is not stable and the drawer  
15   derails easily, causing inconvenience and irritation to the user.

16          To overcome the shortcomings of the conventional auto-returning  
17   device, the present invention provides a drawer with a modified auto-returning  
18   device for drawer rail to mitigate and obviate the aforementioned problems.

19   **SUMMARY OF THE INVENTION**

20          The main objective of the invention is to provide a drawer rail with an  
21   auto-returning device that moves stably to reduce malfunction and automatically  
22   pulls the drawer rail back.

23          Other objectives, advantages and novel features of the invention will  
24   become more apparent from the following detailed description when taken in

1 conjunction with the accompanying drawings.

2 **BRIEF DESCRIPTION OF THE DRAWINGS**

3 Fig. 1 is an exploded perspective view of a first embodiment of a drawer  
4 rail with an auto-returning device in accordance with the present invention;

5 Fig. 2 is an enlarged perspective view of a sliding block in Fig. 1;

6 Fig. 3 is an enlarged cross-sectional end plan view of the drawer rail with  
7 an auto-returning device according to line 3-3 in Fig. 4;

8 Fig. 4 is an enlarged top plan view in partial section of the drawer rail  
9 with an auto-returning device;

10 Fig. 5 is an operational top plan view in partial section of the drawer rail  
11 with an auto-returning device in Fig. 4 where the sliding block is biased;

12 Fig. 6 is an enlarged side plan view in partial section of the drawer rail  
13 with an auto-returning device according to line 6-6 in Fig. 4;

14 Fig. 7 is an exploded perspective view of a second embodiment of the  
15 drawer rail with an auto-returning device in accordance with the present  
16 invention; and

17 Fig. 8 is an enlarged cross-sectional end plane view of the second  
18 embodiment of the drawer rail with an auto-returning device in Fig. 7.

19 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

20 A drawer rail with an auto-returning device in accordance with the  
21 present invention comprises:

22 a track assembly composed of an inner track and an outer track;

23 a driving block formed on the inner track or the outer track;

24 a base movably mounted on the inner track or the outer track opposite to

1 the driving block, wherein, the base has a front end, a rear end, two sides, a  
2 spring recess defined in the rear end for accommodating a spring, a block recess  
3 defined in the front end to communicate with the spring recess, an elongated  
4 through hole defined in the block recess through the base, and a positioning  
5 cutout with a stub notch defined in one side close to the spring recess; and  
6 a sliding block movably accommodated inside the block recess and  
7 having an abutting face with a top edge and bottom edge facing to the block  
8 recess, an extending portion protruding from the abutting face at the top edge to  
9 penetrate the elongated through hole in the base, a limiting cutout defined in the  
10 extending portion to receive the driving block, a spring post formed on the  
11 abutting face close to the bottom edge at one end near the spring recess, and a  
12 stub formed on the abutting face close to the bottom edge at the other end  
13 opposite to the spring post.

14 When the outer track moves away from the inner track, the spring is  
15 extended by force to store restitution force and the driving block engages with  
16 the limiting cutout to drive the sliding block to move until the sliding block  
17 biases to fall into the positioning cutout on the base. Meanwhile, the limiting  
18 cutout of the sliding block is inclined and then the driving block is released from  
19 the limiting cutout to further move forward. On the contrary, when the outer  
20 track moves toward the inner track, the driving block enters the inclined limiting  
21 cutout to urge the sliding block back to a horizontal place. Lastly, the spring pulls  
22 the sliding block back to the original position by the restitution force.

23 With reference to Figs. 1 to 3, the drawer rail with an auto-returning device  
24 is attached on an inner track (20) of a track assembly and comprises a driving

1 block (12) formed on an outer track (10) of the track assembly, a base (30)  
2 mounted on the inner track (20), a sliding block (40) movably attached to the  
3 base (30), and a spring (38) accommodated inside the base (30) to pull the sliding  
4 block (40).

5 The outer track (10) of the track assembly is immovably attached on an  
6 inner side of a compartment for accommodating a drawer. The inner track (20) of  
7 the track assembly is immovably attached on an outer side of the drawer and  
8 slidably engages with the outer track (10). Preferably, a ball bearing race (not  
9 numbered) is clamped between the outer track (10) and the inner track (20) for  
10 smooth movement of the inner track (20) relative to the outer track (10).

11 The driving block (12) extends from a bottom side of the outer track (10) in  
12 a direction toward the inner track (20) by punching the bottom side of the outer  
13 track (10).

14 The base (30) is a substantially rectangular body and has a front face, a rear  
15 face, a top edge, a bottom edge, a first end, a second end opposite to the first end,  
16 a spring recess (32), a block recess (34), and a positioning cutout (36). The  
17 spring recess (32) is defined in the front face near the bottom edge and extends  
18 from the first end to the second end. The block recess (34) with a bottom is  
19 defined in the front face near the top edge on the second end and communicates  
20 with the spring recess (32). An elongated hole (342) is defined in the bottom of  
21 the block recess (34). Preferably, the block recess (34) has an inner sidewall and  
22 a bumper (344) is formed on the inner sidewall to abut against the sliding block  
23 (40). The positioning cutout (36) is defined in the bottom edge near the second  
24 end and further has stub notch (362) defined in the positioning cutout (36).

1     Additionally, two wedges (301, 302) are respectively formed on the front face at  
2     the first end and the second end of the base (30) to respectively engage two  
3     mortises (201, 202) defined in the inner track (20).

4             The spring (38) with an immovable end and a free end has a neck formed at  
5     the immovable end and a hook formed at the free end. The spring recess (32) of  
6     the base (30) further has two opposite inner sidewalls and a pair of cone-shaped  
7     nubs (322) formed on the two opposite inner sidewalls to clamp the spring (38)  
8     at the neck.

9             The sliding block (40) is movably mounted on the base (30) and has a  
10    particular structure as shown in Fig. 2. The sliding block (40) has a front face, a  
11    rear face, a top edge, a bottom edge, a first end, a second end opposite to the first  
12    end, an extending portion (42) with a limiting cutout (422), a spring post (46),  
13    and a stub (44). The extending portion (42) with a top face extends from the rear  
14    face at the top edge toward to the base (30) and penetrates the elongated through  
15    hole (342) in the block recess (34). The limiting cutout (422) is defined in the top  
16    face of the extending portion (42) to accommodate the driving block (12) inside  
17    when the sliding block (40) is mounted on the base (30). Additionally, an  
18    optional inclined face (423) is formed on the first end that is away from the  
19    spring recess (32) to provide a guiding efficiency to the driving block (12) for  
20    disengaging from or engaging with the limit cutout (422). An optional guard  
21    wall (424) is formed on the extending portion (42) at the top edge of the sliding  
22    block to prevent the driving block (12) rushing over the limiting cutout (422).  
23    Moreover, a slit (426) is defined longitudinally in the guard wall, which engages  
24    with the wall of the elongated through hole (342) to keep the sliding block (40)

1     stable inside the block recess (34).

2             Additionally, the stub (44) is formed on the rear face near the bottom edge  
3     at the first end to engage with the stub notch (362) in the positioning cutout (36).  
4     The stub (44) has an outer periphery and a flat face (442) defined in the outer  
5     periphery facing to the second end of the sliding block (40) to abut against an  
6     inner flat wall of the stub notch (362). Therefore, the stub (44) is not easily  
7     disengaged from the stub notch (362). The spring post (46) is formed on the rear  
8     face at the second end near the bottom edge to engage with the hook of the spring  
9     (38). Furthermore, the spring post (46) further has an outer periphery and a  
10    blocking pin (462) formed on the outer periphery and perpendicular to the spring  
11    post (46) to prevent the hook of the spring (38) sliding out of the spring post (46).

12            The arrangement of the base (30), the spring (38) and the sliding block (40)  
13    all attached on the track assembly is shown in Figs. 4 to 6. When the inner track  
14    (20) moves away of the outer track (10), the driving block (12) blocks the sliding  
15    block (40) to make the spring (38) extend because the base (30) is moving along  
16    with the inner track (20) and the sliding block (40) is kept still. Until the sliding  
17    block (40) aligns with the positioning cutout (36), the sliding block (40) is biased  
18    by a pulling force from the spring (38) to lean to the positioning cutout (36).  
19    Meanwhile, the limiting cutout (422) is also inclined to release the driving block  
20    (12) from the first end of the sliding block (40) so that the inner track (40) is  
21    enabled to keep going forward. On the contrary, when the inner track (20) moves  
22    close to the outer track (10), the driving block (12) enters the limiting cutout (422)  
23    again and presses the guard wall (424) to arrange the driving block (12) to a  
24    horizontal position. Thereby, the sliding block (40) disengages from the

1 positioning cutout (36) and is pulled back by the extended spring (38).

2 A second embodiment of the drawer rail with an auto-returning device in  
3 accordance with the present invention is attached on an outer track (10a) of a rail  
4 assembly as shown in Figs. 7 and 8. The second embodiment comprises a driving  
5 block (22a) formed on an inner track (20a) of the rail assembly, a base (30a)  
6 mounted on the outer track (10a) of the rail assembly, a sliding block (40a)  
7 movably received inside the base (30a) and a spring (38a) accommodated inside  
8 the base (30a) to pull the sliding block (40a).

9 The operational process of the second embodiment of the drawer rail with  
10 an auto-returning device is the same as shown in the first embodiment, except the  
11 configuration of the base (30a) is modified to correspond to the outer track (10a).  
12 The base (30a) has further has a pair of wings (303a) extending outward from the  
13 first end. Each wing (303a) has a distal end and a cylinder nub (304a) formed at  
14 the distal end and clamped between the inner track (20a) and the outer track (10a)  
15 for positioning. Moreover, the base (30a) further has a mortise (305a) formed at  
16 the second end of the base (30a) and the outer track (10a) further has a tenon  
17 (104a) correspondingly formed on an inner face to engage with the mortise  
18 (305a). Thereby, the base (30a) is securely attached on the outer track (10a).

19 According to the above description, the drawer rail with an auto-returning  
20 device in the present invention has several advantages as follows:

21 1. The base (30) provides the spring recess (32) and the block recess (34)  
22 for guiding the spring (38) and the sliding block (40) to move inside the base (30)  
23 so that the elements of the auto-returning device move stably to avoid deforming,  
24 mis-aligning and malfunctioning.

1           2. Various positioning elements such as the spring post (46), the blocking  
2 pin (462) formed on the spring post (46), the slit (426) on the sliding block (40),  
3 and stub notch (362) defined in the positioning cutout (36) all confirm the  
4 connections among elements to make the drawer rail stable and durable.

5           Even though numerous characteristics and advantages of the present  
6 invention have been set forth in the foregoing description, together with details  
7 of the structure and function of the invention, the disclosure is illustrative only,  
8 and changes may be made in detail, especially in matters of shape, size, and  
9 arrangement of parts within the principles of the invention to the full extent  
10 indicated by the broad general meaning of the terms in which the appended  
11 claims are expressed.